CLAIMS

1. An apparatus comprising

a nanoporous silicon support comprising a plurality of macropores which support the viability of cells and

at least one individual cell within one of said plurality of macropores,

wherein the support allows the cells to obtain nutrients and oxygen sufficient to maintain the viability of the cells wherein the nutrients are provided by culture medium.

2. The apparatus of claim 1, wherein the macropores have a diameter between 0.2 and 200 microns.

3. The apparatus of claim 1, wherein the macropores have a diameter between 0.2 and 150 microns.

4. The apparatus of claim 1, wherein the macropores have a diameter between 15 and 25 microns.

5. The apparatus of claim 1, wherein the cells are eukaryotic cells.

6. The apparatus of claim 1, wherein the cells are hepatic cells.

7. The apparatus of claim 1, wherein the cells are prokaryotic cells.

8. The apparatus of claim 1, wherein the macropores are coated with a coating substance selected from the group consisting of biomolecules, peptides and proteins that promote cell adhesion on biocompatable polymers.

9. The apparatus of claim 8, wherein the coating substance is selected from the group consisting of collagen, fibronectin, vitronectin, RGD and YIGSR peptides, glycosaminoglycans (GAGs), hyaluronic acid (HA), integrins, selectins and cadherins.

10. The apparatus of claim 1, wherein the matrix is prepared using a method selected from the group consisting of micromolding, electrodeposition machining, laser ablation, laser drilling, micromaching, wet etching, reactive ion etching, lithographic galvanic fabrication (LIGA) and embossing.

11. The apparatus of claim 1, wherein the cells are perfused with culture medium or buffered saline solution.

12. The apparatus of claim 1, wherein the direction of perfusion is in any orientation relative to the support.

13. The apparatus of claim 1, wherein a plurality of supports containing cells are used simultaneously in a single apparatus to increase throughput of the apparatus.

14. A method for screening compounds for biological activity, toxicity comprising adding a compound to an apparatus which comprises:

a nanoporous silicon support comprising a plurality of macropores which support the viability of cells,

at least one individual cell within one of said plurality of macropores, and

wherein the cells are provided with nutrients and oxygen sufficient to maintain the viability of the cells and the cells are monitored for changes in response to addition of the compound.

15. The method of claim 14, wherein the macropores have a diameter between 0.2 and 200 microns.

16. The method of claim 14, wherein the macropores have a diameter between 0.2 and 150 microns.

17. The method of claim 14, wherein the macropores have a diameter between 15 and 25 microns.

18. The method of claim 14, wherein the cells are eukaryotic cells.

19. The method of claim 14, wherein the cells are hepatic cells.

20. The method of claim 14, wherein the cells are prokaryotic cells.

21. The method of claim 14, wherein the macropores are coated with a coating substance selected from the group consisting of biomolecules, peptides and proteins that promote cell adhesion on biocompatable polymers.

22. The method of claim 21, wherein the coating substance is selected from the group consisting of collagen, fibronectin, vitronectin, RGD and YIGSR peptides, GAGs, HA, integrins, selectins and cadherins.

23. The method of claim 14, wherein the matrix is prepared using a method selected from the group consisting of micromolding, electrodeposition machining, laser ablation, laser drilling, micromaching, wet etching, reactive ion etching, LIGA and embossing.

24. The method of claim 14, wherein the cells are perfused with

culture medium or buffered saline solution.

25. The apparatus of claim 14, wherein the direction of perfusion is in any orientation relative to the support.

26. A method of claim 14, wherein multiple compounds are screened simultaneously for interactions.

27. A method for screening a compound for at least one activity under physiological conditions in a microarray comprising

exposing cells in an apparatus which comprises a nanoporous silicon support comprising a plurality of macropores which support the viability of cells,

at least one individual cell within one of said plurality of macropores, and

wherein the support allows the cells to obtain nutrients and oxygen sufficient to maintain the viability of the cells exposed to a compound to be tested and screened for at least one effect of the compound on the cells.

28. A method for analysis of metabolism of a compound comprising

exposing cells in an apparatus which comprises a nanoporous silicon support comprising a plurality of macropores which support the viability of cells,

at least one individual cell within one of said plurality of macropores,

wherein the support allows the cells to obtain nutrients and oxygen sufficient to maintain the viability of the cells exposed to a compound that may be metabolized by the cells,

wherein the nutrients are provided by the culture medium, and

wherein the metabolized compound is recovered from the culture medium for analysis.

29. A method for protein production comprising

exposing cells in an apparatus which comprises a nanoporous silicon support comprising a plurality of macropores which support the viability of cells,

at least one individual cell within one of said plurality of macropores,

wherein the support allows the cells to obtain nutrients and oxygen sufficient to maintain the viability of the cells expressing protein,

wherein the nutrients are provided by the culture medium, and

wherein the expressed protein is recovered from the culture medium.

30. A method to provide hepatic support comprising

exposing cells in an apparatus which comprises a nanoporous silicon support comprising a plurality of macropores which support the viability of cells,

a plurality of hepatocytes within said plurality of macropores,

wherein nutrients are provided by the blood or serum, and

wherein the support allows passage of blood or serum to allow bidirectional mass transfer of large molecular weight proteins sufficient to allow the fluid to be processed by the hepatocytes.